



# **NAVAL POSTGRADUATE SCHOOL**

**MONTEREY, CALIFORNIA**

## **THESIS**

**CROSSING THE RIVER  
A CONCEPTUAL FRAMEWORK FOR RESPONSE TO  
CHAOS**

by

David W. Linthicum

March 2012

Thesis Advisor:  
Second Reader:

Lauren Wollman  
Chris Bellevita

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**CROSSING THE RIVER  
A CONCEPTUAL FRAMEWORK FOR RESPONSE TO CHAOS**

David W. Linthicum  
Captain, Raleigh Police Department  
Raleigh, North Carolina  
BS Appalachian State University 1987  
MBA Pfeiffer University 2005

Submitted in partial fulfillment of the  
requirements for the degree of

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**NAVAL POSTGRADUATE SCHOOL  
March 2012**

Author: David W. Linthicum

Approved by: Lauren Wollman, PhD  
Thesis Advisor

Chris Bellevita, PhD  
Second Reader

Daniel Moran  
Chair, Department of National Security Affairs

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## **ABSTRACT**

This thesis suggests that the existing protocols for initial emergency response to a chaotic event do not take advantage of the decision-making skills of front-line responders. Building from a foundation derived from the concepts of reductionism, holism and the Cynefin framework, a purposeful sample of real-world incidents was examined in an attempt to understand and demonstrate how front-line, emergent decision making can positively impact a chaotic emergency scene.

From the research and sampling, a conceptual framework was developed that supports the implementation of a protocol that encourages front-line decision making. The research also identifies a point during the response that signifies entry into the chaotic domain. The REACT framework (respond, engage, act, communicate and transition) is proposed to empower first responders and give them the ability to respond to a crisis when there is not plan.

The REACT framework is capable of being implemented at the lowest level of emergency response agencies. The utilization of this framework allows the decision-making skills of responders to develop incrementally. In addition, this thesis suggests that the framework serves as a mechanism to teach critical thinking and decision making.

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## **LIST OF ACRONYMS AND ABBREVIATIONS**

AAR	After Action Report
CAD	Computer Aided Dispatch
CRM	Crew Resource Management
FEMA	Federal Emergency Management
GPS	Global Positioning System
IC	Incident Commander
ICE	Isolate, Contain and Evacuate
ICS	Incident Command System
LAPD	Los Angeles Police Department
NIMS	National Incident Management System
PPE	Personal Protective Equipment
REACT	Respond, Engage, Act, Communicate and Transition
SAFER	Security, Attack, Flight, Excessive Repetition, Revised Priorities)
USAR	Urban Search and Rescue

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## **ACKNOWLEDGMENTS**

Early in the program, it is common for students to read the work of former students. After reading several theses, I developed an affinity to quickly turn to the acknowledgement section. You get a feel for the author and it somehow personalizes the body of work. As I write my acknowledgements, I recognize now that this small section signals an end to an incredible journey that has been filled with many highs and lows. It is a transition point that I was not sure I would achieve. Although it may read somewhat like an obituary, that is not my intent. This has been an arduous journey that I am thrilled to have completed; however, I likely will not undertake anything like this ever again!

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## I. INTRODUCTION

### A. PROBLEM SPACE

*At 4 p.m. on August 4, 1949, a lightning storm passed over Mann Gulch, Montana, and is believed to have set a small fire in a dead tree. The next day, the temperature was 97 degrees and the fire danger rating was 74 out of a possible 100, which means "explosive potential." When the fire was spotted by a forest ranger, smokejumpers were dispatched to fight it. Sixteen of them flew out of Missoula, Montana at 2:30 p.m. in a C-47 transport. Wind conditions that day were turbulent, and one smokejumper got sick on the airplane. The smokejumpers and their cargo were dropped on the south side of Mann Gulch at 4:10 p.m. from 2,000 feet rather than the normal 1,200 feet, due to the turbulence. The parachute that was connected to their radio failed to open, and the radio was pulverized when it hit the ground. The crew met ranger, Jim Harrison, who had been fighting the fire alone for four hours, collected their supplies, and ate supper. About 5:10 p.m., they started to move along the south side of the gulch to surround the fire. (The two leaders) Dodge and Harrison, however, having scouted ahead, were worried that the thick forest near which they had landed might be a "death trap." They told the second in command, William Hellman, to take the crew across to the north side of the gulch and march them toward the river along the side of the hill. Dodge rejoined the crew at 5:40 p.m. and took his position at the head of the line moving toward the river. He could see flames flapping back and forth on the south slope as he looked to his left: the fire had crossed the gulch just 200 yards ahead and was moving toward them. Dodge turned the crew around and had them angle up the 76-percent hill toward the ridge at the top. They were soon moving through bunch grass that was two and a half feet tall and were quickly losing ground to the 30- foot-high flames that were soon moving toward them at 610 feet per minute. Dodge yelled at the crew to drop their tools, and then, to everyone's astonishment, he lit a fire in front of them and ordered them to lie down in the area it had burned. No one did, and they all ran for the ridge. Two people, Sallee and Rumsey, made it through a crevice in the ridge unburned, Hellman made it over the ridge burned horribly and died at noon the next day, Dodge lived by lying down in the ashes of his escape fire, and one other person, Joseph Sylvia, lived for a short while and then died. The hands on Harrison's watch melted at 5:56, which has been treated officially as the time the 13 people died.*

*From Norman Maclean, Young Men and Fire*

Crisis. Chaos. In barely a page, this retelling of the Mann Gulch Fire captures the emotion, the intensity, and the life-and-death, split-second decision making required by emergency first responders. Firefighters fight fire, police officers fight crime and paramedics treat the injured. What happens when things do not go according to training or to plan? What happens when things do not make sense? How do responders react when faced with something so new that they have not even imagined its possibility? Terrorism is a relatively new phenomenon in the United States. First responders must be prepared for the next attack: Expect the unexpected is the rallying cry.

Andrew DiFusco, a responder to the World Trade Center on September 11, 2001, recalls asking his fellow fire fighters while driving to the scene, “What’s the plan?” To which one of his partners responded: “We don’t have a plan for this” (personal conversation with DiFusco, 2012). The lack or inadequacy of a plan is not sufficient reason to halt the response. The adage, “the show must go on” could not be more apropos. With or without a plan, the response must continue. It is what first responders are sworn to do and what the public expects responders to do. The only failure would be to not try. This holds true for any “wicked problem” event.

This paper is about dynamic decision making. Brehmer, who studied military decision making, identified four characteristics of dynamic decisions (Brehmer, 1992). First, a series of decisions is required to reach a goal. Any first responder will immediately recognize the fact that a series of decisions must be made during the response to complicated event. Each decision builds from the previous decision and the decisions become interrelated and interconnected. Due to small variances in when and how each decision is made, the outcome can be very different, despite attempts to follow the established protocol.

The second characteristic tends to view the decision-making process on a smaller scale. For example, if a person wished to build a house, characteristics of the first trait would be identifying a location to build and finding a suitable location and identifying a builder. Decisions described in the second characteristic would be decisions that impact the actual construction. For example, if the foundation of the house is built to support a single level home, future attempts to add a second floor could not be completed because



the previous decision to use a weaker foundation prevents the addition of another level. In the public safety field, a similar example might be the decision to locate a staging area or command post in a specific location compared with a decision to deploy a resource to a specific location to begin working on the problem. Once the resource is deployed, it is not available to be used.

The third characteristic is that the problem changes over time (Brehmer, 1992). This change can occur autonomously or as the result of the actions of the decision makers. In simple terms, the problem changing can cause reactive change, such as a fire growing larger as it reaches an abundant fuel source, or the circumstances may change because the decision makers took a proactive step, such as cutting a fire line and preventing the fire from moving forward.

The fourth and final characteristic is that decisions must occur in real time (Brehmer, 1992). The decision must be made when the circumstances dictate a decision, not when the leader feels like enough information is present to make the correct decision. (Bullen & Sacks, 2003). Brehmer notes that dynamic decisions are impacted by time—time is critical and valuable during crisis response. He notes that planning is important, however, once the plan is initiated, the decision-making process moves from decision making to dynamic decision making, which becomes influenced by the immediate feedback of the situation. The dead time and feedback communication delays are what this research attempts to reduce. In his book, *Little Bets*, Sims suggests that taking little bets with imperfect information is acceptable. (Sims, 2011) In context, a little bet would be a decision made by a front line responder to crisis. By using a series of little bets, responders are able to reduce the feedback delays and reduce the time lost.

A central theme throughout this thesis is the perceived conflict between the concepts of reductionism and holism. Simply put, reductionism is the concept of breaking complex things down into their component parts to form a better understanding of a complex item. On the other hand, holism is the premise that understanding the component parts does not necessarily insure complete understanding of the whole. The concept further suggests that in some cases, the whole can be greater than the sum of the component parts. In the public safety field, planning is vitally important. Planning tends

to be very reductionist, as it typically provides step-by-step instructions for accomplishing a task. Under normal circumstances, this form of thinking is logical, simple and quite frankly, very successful. Public safety agencies have developed many response plans for repetitive events.

This thesis is not about the routine response. It is not an examination of what “we,” the collective field of emergency responders do well, instead it is an attempt to look at how “we” respond to chaos.

In a doctoral dissertation written by Tricia Wachtendorf, the moment that signifies the entrance into the chaotic domain is identified as the “oh, shit” (Wachtendorf, 2004 p.26). This tiny phrase is universally recognized by anyone who has been on the front line of crisis. Every responder has been there and in all likelihood, every responder has said it. In a much more academic vein, Wachtendorf writes “the need for improvisation that stems from the inadequacy of the existing system may manifest itself well before an organization adjusts its operation; however the “Oh, shit” moment symbolizes a collective acknowledgement that improvisation is necessary.” (Wachtendorf, 2004, p. 27)

Throughout this thesis, we use the metaphor of a river to talk about the problem space, and in turn the solutions to it. This river represents the obstacle, the crisis that must be solved, or crossed, by the first responder community. Borrowing again from Wachtendorf, we can call this the “Oh, shit” river. Any first responder reading this thesis will immediately recall an event when they unexpectedly met face-to-face with this river: It becomes an iconic moment to the individual and is the point in time that signifies the entrance into the realm of chaos. In many cases, it becomes the point of no return, both literally and figuratively.

When faced with a river as an obstacle, the goal is to cross the river. Some rivers are shallow enough that one can cross it by simply wading through the water. This process might take time, but in the end, the crossing is successful. Another option might be to try and go around to the left or the right in an attempt to find an easier method of crossing. Perhaps there is a bridge nearby. Regardless, this method takes time as well. Another option is to stop and not attempt to cross the river. This would signal the

unwillingness of the individual or agency to make a proactive move to address the problem at hand. To most responders, this response would not be acceptable and for many would not even be considered.

The final method to cross the river is to build a bridge and get over it: to create from scratch, using whatever materials or methods are at hand. Responders must use whatever possible solutions exist to move past the chaotic problem space. This bridge, however constructed, is the solution space explored in the present research.

## **B. PURPOSE OF STUDY**

The purpose of this paper is twofold. First, it is an attempt to identify a model for crisis response that can be used by first responders from any emergency response discipline. Specifically, it is an attempt to provide responders with a response capability when normal, practiced response protocols are inadequate or inappropriate. It is a plan when there is no plan.

The second purpose is to demonstrate that during a truly chaotic event, it is normal for the initial stages of the event to be disorganized, confused and overwhelming. First responders do not have the option of quitting. The faith and trust placed in responders by the public would be severely damaged should a responding agency fail to deploy. Although there are some examples of responders abandoning their posts, such as police officers in New Orleans during Hurricane Katrina, rarely do we find responders quitting, no matter what the odds. Being self-motivated is a common personality trait among police officers, and it is this drive to succeed that can be exploited for the public good (Pollard & Trojanowicz, 1986).

Alcoholics Anonymous places tremendous value on the alcoholic acknowledging the problem. Similarly, this thesis suggests that it is important to the first responder community to recognize that not every response can be handled by an “off-the-shelf” response plan. With or without a plan, the response must continue. Acknowledging that

“we don’t have a plan for this” is acceptable and quite possibly the point at which innovation and improvisation can emerge and flourish—and should be encouraged. (Wachtendorf, 2004)

First responders often state that they are attracted to the job because of the constantly changing nature of the work. This paper is not an attempt to examine the psychological profile of those attracted to employment in the first responder field, but it does recognize that adaptability is not in short supply among those who work in these fields. Firefighters, paramedics and police officers often do not have the newest, best and most modern equipment available to address every problem they might encounter. This handicap does not and should not stop the emergency response. Emergency room physicians and military units engaged in combat fall into the same category of professions in which the urgency and criticality of the event supersede accepted protocols and predetermined plans and equipment needs, resulting in innovation and improvisation.

### **C. RESEARCH QUESTIONS**

The value of this research is that it contends that the individual, low-level responder can and does make a difference in emergency response. A universal decision-making framework for individuals would provide leaders with the knowledge and reassurance that small, impactful decisions are being made by responders on the scene without the requirement of orders given directly by the command element. Operational decisions begin to happen instantaneously and strategic decisions can be made carefully.

What is not clear about this issue is how individuals placed in chaotic situations make decisions. Do the circumstances prevent the individual responder from making decisions or is it instead the structure of the organization that discourages unilateral action by the first responder? Can individuals be trained to the level that allows decision-making actions to be consistent between various responders and can the decision-making process transcend different events? The ultimate goal of this process is to harness the creative decision-making process of all responders during a critical event, so that

individual decisions are made for the collective good. Further, an environment would be created that demands action. Good decisions made quickly are more valuable than great decisions made slowly.

#### **D. HYPOTHESIS**

The premise of undertaking this research is that there is a better, more effective way for emergency workers to respond to chaos. The over-reliance on preplanning does not allow for creativity and innovation to emerge during crises response. Barrett and Fry get more to the point when they note that there is little capacity for creativity and innovation when one is overly concerned with avoiding mistakes or repairing something (Barrett & Fry, 2008 p. 20). It is for this reason that a new response model should be developed.

#### **E. ASSUMPTIONS AND LIMITATIONS**

Just as there is not one, universal, all-hazards response plan, the recommendation of this thesis is not an attempt to provide every responder with a step-by-step guide for every imaginable crisis. Instead, it serves as a step-by-step guide to navigate the chaos associated with crisis response. The author recognizes that wicked problems are constantly evolving and that improvements in technology may dramatically alter emergency response protocols. Further, wicked problems do not have a set stopping point. There is no perfect response plan because the process may not ever end. This thesis advocates building a metaphorical bridge to cross the river of chaos; it does not suggest what type of bridge to build nor does it recommend the materials to be used for construction.

The topic discussed in this thesis is important to the author, and as such, this thesis runs the risk of slight bias towards front-line responders. It is these emergency workers who do not hesitate to act even when faced with enormous, overwhelming circumstances. They are the reason we have so many successful responses from which to draw conclusions. The most important task faced by responders is to “cross the river” when faced with chaos.

When dealing with concepts, such as emergence, chaos, crisis and stress, uncertainty is bound to appear. The science is not yet exact. In addition, because this research focuses on people, there are sure to be exceptions to the rule. Currently, there is no scientific way to measure the human mind under stress outside of a laboratory setting. Perhaps one day, equipment will be available that affords researchers the opportunity to scientifically monitor first responders in field situations.

Another area that hampers this sort of research is the fact that decision-making failure during a crisis or chaos often results in death. Many of the case studies used in this research are taken from AARs that involve death to the responders. We can only put forth a good faith effort when trying to examine the decision-making process of a person under extreme stress. We can never know exactly what facts presented and what all the inputs were that caused them to make a decision. Some evidence may survive to tell the story, however, without firsthand narrative, we are forced to rely on incomplete information. Ironically, acting on incomplete information is one of the things we expect our first responders to do during crisis. It seems somewhat hypocritical to expect someone to operate with incomplete information, and then criticize their actions from the luxury of 20/20 hindsight.

## **F. SIGNIFICANCE OF RESEARCH**

This thesis does not suggest that a dramatically different response is necessary in the first responder community; instead, it suggests that innovation and improvisation have always taken place and responders and commanders should embrace these emergent response dynamics.

Ideally, readers from the first responder community will read this thesis and say “tell me something I didn’t know.” This would serve to unscientifically validate the premise presented in this thesis. Formalizing a practice common to first responders seems pointless until best practices are examined. Innovation and improvisation cannot remain the dirty secret that no one talks about in the emergency response community. Building these traits and the early chaos into response protocols will serve to validate their existence and use during crisis. Improvisation and innovation are how responders cross

the river. The mission is to cross the river, and it is far more important to cross the river and less important to worry about how the crossing occurred, or according to whose authority and direction. The question to be answered becomes: Does the current response protocol meet the needs of emergency workers responding to chaos? If the current system does not work, what will work? And finally, can we teach this skill to young responders?

## **G. THESIS STRUCTURE AND OVERVIEW**

This research is prescriptive and formative in its output. It builds out from the principles described in the Cynefin framework, emergence and complexity. The concepts are used to form and build a conceptual framework that assists first responders faced with chaos. A conceptual model is suggested that recommends that the decision-making capabilities of first responders be utilized to navigate the chaotic problem space.

Samples are drawn from several high-profile or well-documented events to demonstrate the nature of chaos experienced by responders. These cases are purposely selected because they demonstrate the conceptual model, in action. In addition, the selected cases demonstrate the applicability across the various disciplines associated with emergency response and homeland security. In some cases, the referenced events demonstrate actions taken by responders that fit the suggested model, and in others, they are used to show how application of the model could have been used.

The formative process of this thesis utilized many of the concepts set forth by Barrett and Fry in their book *Appreciative Inquiry*. The main catalyst was their description of the process as being “a strength based, capacity building approach to transforming human systems toward a shared image of their most positive potential by first discovering the very best in their shared experience”(Barrett & Fry, 2008). The focus on the human element is tremendously important to the research contained in this thesis. The framework suggested by this research only serves as the hypothetical bridge that must be crossed to navigate chaos. The critical component is the people crossing the

river. Often, the very best in humans emerges during chaos. Harnessing the best that every responder has to offer will surely create a formidable opponent to any act of terrorism or natural disaster.

Included in this thesis are several chapters designed to segregate the various topics that are discussed. This first chapter introduces the problem space and the topic being examined, and the ideas and concepts central to the theme of the research are explored. This chapter serves as a broad overview before the research drills down into the specific issues.

Chapter II provides a review of past research examined as a part of the literature review. Specific concepts, such as holism and reductionism, are introduced in greater detail. In addition, this chapter loosely documents the inter-relatedness of the concepts and shows how one reading led to another reading. This chapter serves as the jumping off point for the research conducted in this thesis.

Chapter III provides background on the cases chosen for review as a part of this research. Many of the cases chosen are familiar to the public safety community and have been used as training points. The intent of these purposely chosen events was to demonstrate the concepts suggested in this research under practical, real-world conditions. This research is not about abstract, theoretical concepts. Instead, the hope is that the sample provides proof and codifies the idea presented in this thesis.

Chapter IV looks at the individual cases in an attempt to identify the teaching points suggested in this thesis. As mentioned previously, every case does not exhibit every trait suggested in this paper, however, most display several of the ideas. The intent of using real-life responder response is to identify specific moments in time that demonstrate the decision-making capabilities of those placed under extreme stress.

Chapter V seeks to demarcate a brief stopping point regarding this framework. More research is needed to validate the recommendations suggested in this thesis, and it is the hope of the author that this is but a start for a continuation of this work. This chapter also will demonstrate that this conceptual framework can be taught to responders from any discipline and applied across the country.



## **II. LITERATURE REVIEW**

The following chapter discusses previous research and concepts that helped the author shape, form, articulate, and visualize the conceptual framework suggested by this research. The literature reviewed in this chapter merely scratches the surface of the available work.

### **A. REDUCTIONISM**

Human beings are wired for reductionist thinking. The fight—or—flight syndrome is a very simple survival technique that humans utilize on an almost daily basis. In a split second, the human mind makes thousands, if not millions, of calculations regarding threats (regarding threats specifically, or generally sorting through stimuli and information?). The process of reducing the threat into its simple basic parts is, for lack of a better term, reductionism. R. L. Ackoff, an organizational theorist, describes reductionism as the doctrine that maintains that all objects and events are made up of indivisible basic elements, and that we can gain insight into these objects by analyzing the elementary parts (Ackoff, 1974).

In the field of public safety, split second decisions are often required. Reductionism is often used as a system to assist leaders and responders through the decision making process. Reductionism is the process in which the whole is broken down into its component parts. The whole can be more clearly understood by understanding the component parts. Intuitively, this thought process makes sense and is logical. Further, reverse engineering an incident or event allows best practices to emerge. A by-product of this thought process is often a checklist. Step-by-step procedures are laid out in a very linear fashion. Strict adherence to the checklist presumably yields the same outcome after multiple applications.

In the sciences, reductionism has been used as a method for researchers to understand complex issues. Webster defines science as: systematic knowledge, especially of the physical world. Science connotes exact cause and effect and tends to be black and white. Because of the exact nature of scientific work, reductionism is often used to break

things into their component parts for better understanding. The scientific process itself is in large part about breaking things into components and isolating single causes and effects.

Reductionism is also recognized as a way to tackle practical problems (Verschuren, 2001, p. 390). In the public safety field, reductionism serves its purpose well and lends itself well to the teaching and training process of first responders. Borrowing from Covey (1989), the recommendation to understand before being understood dovetails nicely into the reductionist form of thinking. Small pieces are much easier to grasp, digest and ultimately, understand. Sir Isaac Newton is credited with stating that reality is understandable by means of scientific reductionism (Burns, 2002). Further, he submits that the linear universe can be understood, accurate predictions can be made, and phenomena potentially controlled, as humans apply their reason to break the universe into its most basic parts and then logically put them back together again (Burns, 2002).

Scientists, in particular physicists, have embraced the concept of reductionism. V.V. Raman, a physicist and philosopher, has written about the collision of religion and science. He notes that fission, fusion, gravity and force are all examined by reducing the theory to the smallest atoms and molecules (Raman, 2005).

When viewed through the lens of public safety, response plans have typically been reductionist and expected to be applicable to any conceivable crisis. Intuitively, reductionism is logical and its linear course is reasonable and easy to understand. Reducing crisis and disorder into smaller parts makes sense. However, when carried to the extreme, a paradox emerges. The notion of one, simple plan being used for every imaginable crisis does not make sense. This cognitive dissonance becomes troublesome despite the simplicity of reductionism and the ease with which it is used.

## **B. HOLISM**

The counter to reductionism is holism. Raman describes holism as the philosophical view that considering the whole picture one gets a deeper and more complete view of a situation than by analyzing it into its component parts (Raman, 2005).

To illustrate this thought process, he uses a water analogy. A reductionist would break down a molecule of water into its component parts, two hydrogen atoms and one oxygen atom. Understanding these individual atoms on their own does not provide an accurate representation of what results from a combination of the individual parts (Raman, 2005). The end result is that water has vastly different properties than the gases used to create the water. Further complicating matters is a position held by Alan Wallace, “that reducing the human being to a complex of atoms governed entirely by laws of physics seems an article of faith rather than a scientific fact”(Wallace, 2003 p. 162). Another explanation regarding the importance of holism as a concept is set forth by Weinberg and a weather analogy. He notes that scientists have a very thorough knowledge of wind, temperature, cold fronts and warm fronts, yet, predicting the movement and accurately forecasting weather is extremely difficult, despite the thorough understanding (Weinberg, 1995).

In an effort to explain an important concept in holism, Verschuren (2001) describes the performance of a football team from both a reductionist and holist perspective. The talent and skill of the individual players can be examined. Good or bad, an expectation of their performance can be extrapolated. The sum performance of the individual players can be logically deduced. In simple terms, the team can be labeled a good team, “on paper.” However, a team of all-star players does not necessarily guarantee a winning performance. Likewise, a team of under achievers does not guarantee a losing performance. This example demonstrates the concept that the whole can, in fact, be greater than the sum (or worse) of the individual parts.

The linear process of reductionism is further questioned by holists when looking at systems that do not fall nicely into a linear framework. Burns points out that currently no mathematical formula exists to explain how smoke flows out a chimney or how a cloud constantly changes shape (Burns, 2002).

In a similar vein to the concept of holism, Malcolm Gladwell dedicates an entire book to the idea that humans are capable of taking a holistic snapshot of things, people and events and correctly processing these “thin slices” and draw accurate conclusions about the matter at hand (Gladwell, 2005). His premise, detailed in his book “Blink, The

Power of Thinking without Thinking” stands in direct opposition to the reductionist mindset described previously. Throughout the book, he relates real-life events during which doctors, nurses, firefighters and police officers made split-second decisions using limited information. More often than not, these decisions are correct. He asserts that “there are moments, particularly in times of stress, when haste does not make waste, when our snap judgments and first impressions can offer a much better means of making sense of the world” (Gladwell, 2005). His link to sense-making is key and has tremendous relevance to the first responder community.

The Incident Command System relies heavily on information flow. Information is generally funneled up, to the Incident Commander. The linear structure of Incident Command lends itself to information overload. In crisis or disorder, processing information leads to reactive action, a stimulus response action. Gladwell describes a study conducted at the Cook County hospital in Chicago involving the triage of chest pain patients in the emergency room. The conclusion of the experiment resulted in what is called the Goldman algorithm (Gladwell, 2005). The overall conclusion of this experiment was that extra information about a patient is not an advantage. Ultimately, very little is needed to understand a complex phenomenon (Gladwell, 2005). Again, this translates well into some of the problems associated with responding to a complex or chaotic incident. The axiom less is more appears to have relevance.

### **C. EMERGENCE**

Another concept that impacts crisis and disorder is the idea of emergence. Goldstein describes emergence as the coming into being of novel, “higher” level structure, patterns, processes, properties, dynamics, and laws, and how this more complex order arises out of the interactions among components that make up the system itself (Goldstein, 1999). The idea that a pattern will emerge from a chaotic situation demonstrates the importance of time during a state of disorder. Given time, a pattern tends to emerge. By observing the pattern, a response can be crafted. What is not clear is if responders can, by their actions, alter or change the emerging pattern. Further confounding the response is the idea that disaster response occurs in the context of high

levels of uncertainty regarding both what and who will be useful to the effort and how to select satisfactory responses in the midst of a rapidly changing operational environment (Buck et al., 2006).

#### **D. CYNEFIN FRAMEWORK**

An innovative decision-making framework has been proposed by David Snowden and Mary Boone. The Cynefin framework divides decision making into one of five categories: simple, complicated, complex, chaotic and disordered (Snowden & Boone, 2007). Simple decisions are described as “known, knowns” (Snowden, 2007). The matrix for decision making follows the order of sense, categorize and respond (Snowden, 2007). This process is often characterized by the use of best practices.

Complicated problems may have multiple solutions and are described as “known, unknowns” (Snowden, 2007). The decision-making process is described as sense, analyze and respond (Snowden, 2007). Since this process acknowledges that the possibility exists for more than one answer, Snowden suggests that a common feature to this response technique is a good practice.

The next area of decision making is the complex problem. Snowden assumes that at least one correct answer exists for the problem at hand, and a complex problem is often described as “unknown unknowns” (Snowden, 2007). Snowden suggests a decision-making process of probe and sense followed by respond (Snowden, 2007).

The fourth decision-making area is chaotic. Chaotic decisions often center on issues that are unknowable (Snowden, 2007). The chaotic decision-making process can be described as act, sense and then respond (Snowden, 2007). This process suggests that time is valuable and often not available to the decision maker. Action must be the first order to attempt to establish control. As control is gained, the decision-making process can transition to one of the other decision-making categories.

The final step in this matrix is disorder. Snowden notes that it is very difficult to recognize when one is situated in disorder. Characteristics of the other areas may be

present, which can cause confusion for the decision-making process. Moving decision making to one of the other quadrants is the suggested manner in which to handle the problem of disorder.

The Cynefin framework suggests a decision-making process for leaders, but it does not specifically mention the applicability to the decision-making process of the first responders. Clearly, all responders will be faced with decisions that fall into one of more of the listed categories; therefore, it is logical to embrace this matrix for use by individual officers.

## **E. BUTTERFLY EFFECT**

Edward Lorenz, a meteorologist from MIT, discovered what has been called the Butterfly Effect while studying weather patterns. Utilizing a computer to predict weather patterns, he discovered that slight changes in the number of decimal places resulted in vastly different outcomes in the mathematical problem, the idea behind this theory being that a butterfly flapping its wings in one part of the world can impact the weather in another part of the world. Again, this concept, albeit extreme, tends to have relevance to emergency responders in that slight variances of response can have dramatic impact on the outcome of the response. If we accept that patterns emerge during chaos, then it is important to recognize that slight variances to emergency response can result in vastly different outcomes from one emergency to the next—even if the same plan is used. It is not, therefore, logical to expect that one plan can be replicated over and over with the same result.

Often overlooked in crisis is the emergence of untrained responders. Most emergency response plans do not take into consideration the fact that in many cases civilian responders will already be on scene and will begin taking action without oversight and direction from a command authority. This emergent response capability must be included and harnessed for the common good because it cannot be eliminated. One criticism of the Incident Command System is the emphasis on formal organizations and its failure to recognize the presence of unorganized volunteers and emergent groups, as well as the structure and function of established organizations during the response

(Buck et al., 2006) Moynihan points out that during the response to Oklahoma City and the Pentagon, despite the relatively contained perimeter, incident commanders struggled to control the volunteers and unsolicited services that were offered (Moynihan, 2007).

Finally, the Incident Command System itself must be examined. It is well known that the ICS was developed in California during the early 1970s as way to combat forest fires and brush fires. It was determined that a common framework for response was needed to coordinate the various different responders, mostly firefighters, repeatedly called to fight wildfires. What originally started out as Firescope evolved into Incident Command (IC). Whether right or wrong, the federal government mandated federal agencies adopt the NIMS program, which uses ICS, as the generic response framework to all emergencies that may have federal involvement or federal financial support (DHS, 2004).

In reviewing the efficacy of the ICS, Moynihan uses several case studies, such as Oklahoma City, Hurricane Katrina and the Pentagon, to learn about crisis response. From his examination, he develops three conclusions. First, he notes that even with centralized network governance, the diversity of the responders makes coordination difficult (Moynihan, 2006). The vastly different mission of police officers, firefighters, paramedics, and emergency managers is enough to cause confusion, not to mention the jurisdictional differences encountered at large scale emergencies.

His second conclusion is that authority is shared among members, and therefore, subject to contention (Moynihan, 2006). The resulting command struggle weakens the overall response.

The final conclusion made by Moynihan is that the single biggest factor in determining the success of the ICS is positive working relationships and trust (Moynihan, 2006).

## **F. PREDICTABLE SURPRISE**

The potential shortcomings of the ICS pointed out by Moynihan dovetails nicely to a concept identified by Bazerman and Watkins. They propose that an event or set of

events that take an individual or group by surprise, despite prior awareness of all of the information necessary to anticipate the events and their consequences, is a “predictable surprise” (Bazerman & Watkins, 2004). The first trait of a predictable surprise is that leaders knew a problem existed, and that the problem would not solve itself (Bazerman & Watkins, 2004). Many of the previous reference works have noted potential shortcomings of the ICS. Failure to address these potential weak areas does allow the ICS to drift toward the category of predictable surprise when the system fails to work during a future event.

The second characteristic of a predictable surprise is the idea that the team members recognize that the problem is getting worse over time (Bazerman & Watkins, 2004). The third quality of a predictable surprise is that fixing the problem will incur significant cost (Bazerman & Watkins, 2004). The NIMS program and the ICS program are now taught nationwide with multiple documents describing how the plans should be implemented. Despite the claim that ICS is scalable and can be modified, strict adherence to the doctrine is very common throughout the United States. Major modifications to the ICS and NIMS will require significant printing costs and countless changes to lesson plans. Failure to make these changes will lead to a predictable surprise.

The fourth area pointed out by these researchers is the idea that the cost required to prevent a potential surprise can be expensive when compared to the cost of the consequence expected (Bazerman & Watkins, 2004). This idea is a bit like monetizing crime prevention or fire prevention. How does one place a dollar value on a crime or fire that did not occur and thereby justify the cost of preventing the event that did not occur? Clearly, this trait has relevance to the Homeland Security enterprise as the cost associated with improving security is difficult to measure against a thwarted or prevented attack.

The final trait of a predictable surprise relates directly to the human element. The aversion of people and organizations to change maintains the status quo (Bazerman & Watkins, 2004). As responders have now become very adept at completing ICS paperwork and filling out organizational charts following the ICS model, the willingness to modify and change is met with resistance. The idea that “this is how we do it now” is rampant in the public safety field.



Bazerman and Watkins are quick to point out that governments cannot be expected to predict the specifics of an event, but they should be better at anticipating the broad variety of catastrophes (Bazerman & Watkins, 2004).

## **G. STARFISH AND SPIDER**

In the *The Starfish and the Spider*, authors Ori Brafman and Rod Beckstrom discuss the resiliency of organizations without defined leaders. To demonstrate their premise, the authors use the analogy of spiders and starfish. They note that the creatures are similar in shape and design, however, are very different in the manner in which they operate. A spider, for example, will die if the head is crushed. A starfish, on the other hand, can have a leg cut off or be cut in half only to regenerate the part that is cut off. Ultimately, the starfish will become two starfish.

The authors examine several successful businesses and organizations that operate like a starfish. Organizations, such as Al Qaida, have been deemed successful due to their resilience and ability to regenerate after seemingly devastating blows to their organization. The value of the starfish structure provides insight into how first responders can respond to crisis situations. A public safety organization with a starfish mindset should become more resilient and successful.

## **H. BLACK SWAN**

In *The Black Swan: The Impact of the Highly Improbable*, author Nassim Taleb defines a Black Swan event based on three criteria. First, the event must be an outlier (Taleb, 2007). The event must be so extreme that it falls on the outer edges of a bell curve. Second, the event must have extreme impact. Finally, despite the event falling into the outlier realm, there must be an attempt to explain or rationalize the event despite the obvious rarity of the event. A central point in his book suggests that Black Swan events do not occur according to a plan. Further, the author suggests that we need to adjust to the existence of a Black Swan instead of trying to predict its occurrence (Taleb, 2007 p. XXV). This is critical in the field of public safety, as we try to identify potential terrorist threats and anticipate the next terrorist attack. Another key point in his work is the idea that we tend to learn the specific instead of the general. This speaks directly to his

premise that following an event we are able to quickly rationalize what occurred. As such, in the field of emergency planning, we have a tendency to create a plan that addresses a specific incident instead of creating a plan that allows us the flexibility to adjust to the complexity of a Black Swan event.

The goal of including concepts and ideas developed by other researchers is to set the stage for the research conducted in this thesis. The concepts discussed in the literature review serve as the foundation and starting point for this research. The most significant concept is the difference between reductionism and holism. To some, this may be as great a divide as the philosophical differences between liberals and conservatives. To others, the differences may not be so well defined and may be more closely described as a grey area. Regardless of the view of the reader, the fact that there is a difference between the two ideas is critical to the understanding the conceptual framework suggested by this thesis. Specifically, this thesis will show how components of both concepts are needed to safely navigate chaos during emergency response.

This thesis uses a metaphorical river to help articulate the ideas presented. If we present reductionism and holism as two rivers that eventually meet, the area of convergence would be best described as the area of emergence. From this concept, we understand that we know there will be some disorder; however, we will not be able to predict exactly what will occur. Further, from this disorder, a pattern will emerge. With time, the rivers will merge and an orderly pattern will emerge. Patterns suggest repetition. If responders train to look for this repetition, a response can be formulated.

From a theoretical perspective, the Cynefin framework describes disorder, chaos, complicated, complex and simple. The movement among these areas is a main focal point of this thesis. A premise of this research is that individual responders can make decisions that can assist in moving a crisis from disorder to the more manageable realm of simple or complicated. There is no implication that this is an easy task; however, Cynefin provides a framework for understanding the various movements between the different domains.

### **III. BACKGROUND/PROBLEM SPACE**

#### **A. MANN GULCH FIRE**

##### **1. Mann Gulch Fire, 1949**

On August 4, 1949, lightning started a fire in Mann Gulch, Montana. The fire was spotted by a fire watch officer who reported the fire and began efforts to halt the fire by himself prior to the arrival of fifteen smokejumpers. Initial reports resulted in the fire being slightly underestimated. Fire slang labeled the fire as a 10 o'clock fire. This name was given to a fire estimated to be under control by 10 o'clock the next day.

The smokejumpers were deployed near the fire about 1600 hrs. A few ate a quick meal and commenced in efforts to fight the fire. At some point, the leader, Wagner Dodge, noticed that the fire had jumped the gulch and was moving rapidly toward the firefighters. After a brief withdrawal, Dodge ordered his men to drop their tools and flee the fire. At some point, Dodge realized that they could not outrun the fire. He prepared to light an escape fire in an effort to “burn a hole in the fire” so as to escape the oncoming fire. None of the men heeded his warning and within two hours of arrival, thirteen men were dead or burned enough that they would eventually die from their injuries. Although the dynamics of the fire in this event are important, the primary focus of this case study is to identify actions of the people involved in fighting the fire as opposed to the physics of the fire itself. The accounts used for this example will be Weick’s article, *The Collapse of Sensemaking in Organizations: The Mann Gulch Disaster* and the USDA’s report authored by Richard Rothermel.

#### **B. NORTH HOLLYWOOD BANK ROBBERY**

##### **1. North Hollywood Bank Robbery**

On February 28, 1997, two armed men entered the Bank of America building in the North Hollywood section of Los Angeles. Soon after, one of the most intense police shootouts took place that resulted in the two armed robbers being killed—one by his

own gun—the other as a result of injuries sustained during the gun fight. What is instructive about this incident is how this changed from a robbery to a chaotic unknown as a result of the tactics of the robbery suspects.

Two men entered the bank with the intent of committing a robbery. Before they could complete the robbery, they were spotted by members of LAPD. The police officers radioed a call for assistance and began to engage the suspects. What transformed this incident immediately was the fact that the two suspects had prepared for a shootout by appropriating several semi-automatic weapons and modifying them to allow fully automatic fire. They also acquired a significant amount of ammunition for each of the weapons. In addition, the men donned body armor to protect their torso and limbs. It was later determined that they also prepared for the adrenalin rush by ingesting Phenobarbital. Coupled together, these facts made the encounter with LAPD very one-sided.

The responding officers acted appropriately but quickly found their weapons and ammo useless against the heavily-armed and very well-protected gunmen. As with the previous cases already cited, the specific details of the shootout are not the focus of this inquiry. Instead, the actions of some of the officers who took highly unusual steps to address the threat will be considered.

One of the first acts of the responding officers after they recognized that they were outgunned, and could do little to stop the suspects, was to commandeer an armor delivery vehicle to provide protection during the evacuation of wounded officers and civilians. Though common in movie scripts, police commandeering a vehicle is a highly unusual event in the real world. The second act was to locate a source of heavy weapons at a nearby gun store and bring them to bear against the suspects. Again, a highly unorthodox and unsanctioned behavior that was a very appropriate response based on the circumstances at hand. Ultimately, their actions were validated when several of these officers were officially recognized with departmental awards for bravery. The actions of these officers was not unusual in the sense of being unreasonable, rather their actions were not dictated by policy and standard procedure. These officers improvised, and created a bridge with materials available at the scene. They built a bridge to engage the chaos.

## **C. U.S. AIR FLIGHT 1549**

### **1. U.S. Air Flight 1549**

On Jan. 15, 2009, a US Airways jetliner with 155 people aboard flew into a flock of geese and lost power in both engines shortly after taking off from La Guardia Airport on its way to Charlotte, N.C. The pilot, Capt. Chesley B. Sullenberger III, splash-landed the plane in the icy Hudson River. Ferries and rescue boats swarmed toward the plane from both banks of the river, and all on board were brought to shore safely in a dramatic episode that made Mr. Sullenberger a national hero to many, and entered the rescue of Flight 1549 into airline lore.

What might have been a catastrophe was averted by a pilot's quick thinking and deft maneuvers, and by the nearness of rescue boats, a combination that witnesses and officials called miraculous.

The aircraft struck the geese at 2,700 feet within 1 minute 37 seconds after takeoff. At that point, according to transcripts from the air traffic control of that flight, Captain Sullenberger told the tower that "we lost thrust in both engines." He determined quickly that he could not return quickly enough to La Guardia or make it to Teterboro Airport in New Jersey for a safe landing. "The only option remaining in the metropolitan area that was long enough, wide enough and smooth enough to land was the Hudson River," he said.

All of the passengers, including at least one baby, and both pilots and all three flight attendants, were transferred to the rescue boats, even as the crippled white-and-blue jetliner continued to drift south. When all were out, officials said, Captain Sullenberger walked up and down the aisle twice to make sure the plane was empty.

NY Times, June of 2009

The New York Times description of the events occurring on January 13, 2009, demonstrates the tremendous time constraint the pilots of this aircraft were placed under and the incredible decision-making skills they exhibited. Although we do not know what the pilots were thinking, we do know what they said. Surely, the communication between the pilots derives directly from what each of them was thinking. The flight data recording of their conversations provides unique insight into decision making during crisis and chaos.

## **D. JOPLIN MISSOURI TORNADO**

### **1. Joplin Missouri Tornado**

A FEMA after action report describes the Joplin Missouri tornado as follows:

On Sunday, May 22, 2011, a catastrophic Enhanced Fujita-5 (EF-5) tornado struck the City of Joplin, Jasper County, and Newton County in southwest Missouri in the late afternoon. With winds in excess of 200 miles per hour (mph), the  $\frac{3}{4}$ -mile-wide tornado cut a 6-mile path of destruction through central Joplin. The tornado caused 161 fatalities and approximately 1,371 injuries as of May 27, 2011, making it the single deadliest U.S. tornado since 1947. Thousands of structures were destroyed or damaged, from single family homes to apartment buildings to large retail and public buildings, including St. John's Regional Medical Center, the Home Depot, and Wal-Mart.

FEMA, 12-20-11

The events that took place in Joplin, Missouri, while tragic, provide the emergency response community with a tremendous opportunity to learn and a tremendous platform from which to grow. The resilience and innovation demonstrated by the responders and citizens serves as a real-world example of the premise of this thesis. The starfish mentality is very evident during an event that resulted in the loss of a major hospital and an area where the devastation was so immense that navigating without a GPS was extremely difficult.

## **IV. FRAMEWORK**

The acronym for this framework emerged from several of the concepts and theories that were reviewed while conducting the research. Further, through discussions with members of my cohort, previous experiences, and many years of impromptu conversations with other members of the public safety community, arose the courage to try and articulate this method.

Under stress, simple is good. Real simple is even better. Acronyms and catch phrases are often ridiculed as being hokey and clearly not academic. Some might claim that they are even unprofessional and are more an example of the power of marketing as opposed to the true message presented. We have all heard “See something, Say something,” “Booze it and Lose it,” despite the childish, simple language, the message is clear. In the public safety community, we use acronyms like “ICE” (Isolate, Contain, and Evacuate) for tactical situations and “SAFER” (Security, Attack, Flight, Excessive Repetition, Revised Priorities) for tactical communications, better known as Verbal Judo. These key phrases and keywords serve to prompt the memory of those trained in their use.

The acronym proposed in the research is REACT (Respond, Engage, Act, Communicate and Transition). We often ask ourselves how we will react to this problem or this threat. This framework serves as a jumping off point for those faced with the response to a chaotic event.

### **A. RESPOND**

Respond to the event. While this may seem blatantly simplistic, there is much more behind this first step than meets the eye. In a day with computer dispatch and perhaps shrinking staffing levels, responders may be trained and socialized to respond only when dispatched. For most calls for service, this is necessary and highly recommended. However, when faced with the highly unexpected “Black Swan” event or wicked problem, all available responders should respond.

Many after action reports note the problems associated with self-dispatch. The 9/11 Commission report mentions the problem of self-dispatching of responders to the Pentagon and to the World Trade Center. Most commonly cited reason for leaders opposition to self-dispatching is for accountability and safety. Reluctantly, many leaders note that they were happy to receive the help but would have preferred to have the resource or asset dispatched upon the request of the on-scene commander.

Recalling that this framework is designed for the highly unusual, highly improbable event; do we really want to restrict assets from responding to the scene? The answer is “no.” The real problem identified by this concern is that self-dispatched units often remain on the scene long after they are needed. A very simple example of this issue can be understood by anyone who has ever had a car break down on a highway and been the beneficiary of unsolicited help. While driving down the road, some mechanical defect or flat tire causes your car to stop on the highway. In an effort to address the problem, you begin to push your car in an attempt to get it off the highway and to a safer place to work on the car. Unsolicited, a couple of cars stop and the occupants jump out to provide assistance by helping push the car to the side of the road. Almost as quickly, they return to their car and drive away. It is this type of response mechanism that may have great value to a crisis response.

This extremely simplistic example is the mindset that should be cultivated in responding assets. Whether dispatched or not, as soon as an event can be identified as a highly unlikely, high-impact event, resources are needed at the scene. Mother Nature demonstrates this mentality with the concept of swarming. Bees and ants are the most prominent example of this behavior. Any sudden damage to the hive or ant hill is met with a ferocious response to the threat. Granted, this behavior is a survival mechanism and more defensive in nature, but it does lend itself to the public safety field. If protection of the public and property is one of our goals, surely this swarming mentality will assist in accomplishing this goal.

In a 2010 thesis, Theodore Moody points out that over-convergence of personnel is a significant issue, particularly when the response is to a paramilitary attack, such as the Mumbai or the North Hollywood shootout. His point is valid; however, it does not



provide convincing evidence to completely rule out a substantial response by emergency responders. It does suggest a training point that can be instilled early in the career of emergency responders. If an event is recognized as an active shooter event, tactics to prevent over-convergence are required. Many police departments currently address this problem with response protocols to armed robberies. Since most armed robbery suspects have left the building before police dispatch, the typical police response is two officers to the location, as well as a supervisor. The remaining officers respond to nearby locations to observe vehicle traffic and likely escape routes. If needed, more officers can be called to the scene. This type of response can easily be integrated into crisis response training for active shooter events. I believe that this caveat satisfies the point raised by Moody.

A secondary issue raised by over-convergence is the simple issue of parking. Ingraining in the minds of first responders, the necessity of maintaining ingress and egress routes will require some repetitive training. Parking skills can be learned. Practicing what could be called “controlled convergence” or “calculated convergence” would give responders the opportunity to respond to crisis in an orderly fashion. We underestimate our first responders, if we suggest that they are incapable of responding in this fashion. Police officers position their police cars in advantageous positions for traffic stops, paramedic’s park ambulances in a location to allow quick access to equipment, and fire fighters position apparatus in locations that provide access to hydrants and provide the quickest route to deploy lines. This skill can be taught.

Another “R” can be inserted into this framework based on the circumstances of the event. Responding to the event operates on the assumption that the event has already occurred, however, a significant number of events transition quickly from a “normal” event to a chaotic event. In the event that this occurs, the responder must recognize that something has changed in the event. It is this moment in time that alters the outcome of the response. The failure to recognize that a dramatic shift has occurred can result in devastating consequences. An example of this sort of rapid transition would be the moment in time a group of people waiting in line on Black Friday to enter a store

suddenly start a rampage when the store doors are opened, or the moment in Los Angeles following the Rodney King verdict that public outrage turned violent and resulted in days of rioting.

There is no assumption that this transition point is easy to see and recognize. Subtle occurrences may be difficult to spot. Not all situations will be as easy to recognize as the pilots of Flight 1549 recognizing immediately that both of their engines were taken out by multiple bird strikes. We must teach and expect our responders to recognize these subtle clues, if we are to be more resilient. Focus is important but tunnel vision can be fatal. We must seek balance in our response protocols.

## **B. ENGAGE**

As this framework began to emerge, I admittedly had difficulty differentiating engagement from step three which is act. The difference, while subtle, is worthy of explanation. Simply responding to the scene is not adequate. Responders must begin to insert themselves into the event. Assuming that firefighters will fight fires, police officers will protect and enforce laws, and paramedics will provide care to injured, the engagement suggestion would be to take steps to begin to provide the service you are trained to provide. There is a significant portion of this part of the framework that focuses on the mental preparation and analysis. This is a preoutcome based thought process.

In some cases, the engagement factor may be as simple as locating other responders and starting to gather basic information regarding the event. Responders may also begin to take steps that could be considered more defensive in nature. Defensive measures would be steps to protect themselves and the equipment they have delivered to the scene. It may also include attempting to identify equipment and Personal Protective Equipment (PPE) needed to assist with the response.

I once had the opportunity to serve as an observer to a very large scale, multi-agency, multi-discipline training exercise. During the “hot wash,” several paramedics indicated that they responded to the scene but were never asked by the incident commander to do anything. This is precisely what should not occur. Had these paramedics responded to the scene and engaged in the event, they could have inserted

themselves into the scenario. Had they simply announced on the radio their arrival, or if one member of their team had gone to the command post and asked “where do you need us,” the medical aspect of this event would have occurred much sooner. In a real-world event, lives would have been saved.

### **C. ACT**

Act connotes activity and is more easily recognized as a verb. Act is what responders do best, what they are trained to do, and quite honestly, what they want to do. This action is more concrete and visible. There is a physical element to this part of the framework. Initially, the suggestion that responders act is more along the lines of a proactive action. Once the initial sense making has taken place, the responders can begin to provide the service they have trained to do. Firefighters can begin to fight the fire, medics can begin to treat the injured, and police officers can begin to provide protection and/or attempt to neutralize the threat should it be a person.

Act implies that some sort of affirmative action. There is no implication that the responder will know exactly where to respond to or what threat to address. The goal for this step would be to determine a course of action that provides a satisficing outcome. Satisficing is implementing the first plan or action that can get the job done. It does not necessarily have to be the best solution; however, it is solution nonetheless. Far from being a 70 percent performance mentality, satisficing will help sustain the response until a more permanent solution can be implemented. An example of satisficing would be plugging a pin hole leak in a steam pipe with a pencil point. Clearly, not a long-term solution, however, the result is satisficing enough to get the job done until the permanent fix can be planned and implemented. This framework recognizes that the outcome of an event can be influenced by something as simple as which cardinal direction the responder arrived. For example, a fire engine company may respond to a structure fire from the north. Another engine company may also arrive on the north side of the fire. Since one engine is already present, the second responding engine may elect to shift to the east side or west side. As Gladwell suggests in *Blink*, despite having incomplete information, humans are capable of intuiting the correct response (Gladwell, 2005). With adequate

time, the engine company may be able to communicate prior to arrival on the scene and ask where they should deploy, however, in the event of chaos; the emergent response is more likely. Apparatus responding to the World Trade Center likely deployed from a position of convenience that resulted from their original location, as opposed to being directed by units on the scene.

Act does not preclude responding units from engaging in activity not normally associated with their profession. For example, police officers may provide basic first aid to victims and fire apparatus may be used to provide cover for responding police officers. The ability and willingness of responding assets to improvise is critical to the outcome of the event. In fact, the author would recommend that all emergency responders embrace and expect to undertake nontraditional roles.

A highly controversial idea is the notion of utilizing untrained, civilian resources at the scene. Legal issues notwithstanding, using these untrained responders may free up professional responders to provide more technical skills elsewhere. Once again, acknowledging that untrained civilians may be on the scene allows responders to mentally prepare for their existence. Often, we celebrate civilian involvement following their quick actions that saved a life. These events are viewed as anomalies, despite the fact they occur far more often than we are willing to admit.

Once again, it must be understood that the REACT framework is designed to be used during highly improbable events and events that potentially have tremendous consequences associated with the aftermath. Emergency service providers are very capable of handling routine or ordinary calls for service. Simply being notified of the event via the 911 systems may be all that is needed from the general public. During these general calls for service, it is very likely that assistance from the public is not needed and asking civilians to “step aside” is perfectly legitimate and more than likely, recommended.

#### **D. COMMUNICATE**

It is very possible that the communication aspect of this framework will become the most critical aspect of the response and decision-making framework. The main goal of this part of the framework is to alleviate the issue often raised during the self-dispatch phase of the emergency. This paper does not suggest, nor does it recommend, responding to an event, self assessing the situation, and then leaving the scene without communicating with those in charge of the response. There is a delicate balance between necessary and important radio traffic and radio traffic that can best be described as “housekeeping traffic.” Much like the definition of pornography, it is difficult to describe, but any first responder who has experienced the inability to broadcast critical information can attest that it is easy to point out when you see it.

It is critical to the first responder community that communication takes place. It is essential that incident commanders and other assets on the scene are aware of the existence of complimentary units and their location. During a crisis, time is relative. Looking through the lens of relativity, it may be possible for a responding unit to notify the IC within seconds of arriving on the scene. On the other hand, circumstances may dictate that other actions take precedence over notifying the IC structure. Ultimately, it is incumbent on the responding units to make their presence known. If this were an in-service training session, this point would be repeated, perhaps twice, so as to emphasize the importance of this aspect of the response.

The inability to communicate and the lack of communication are oft cited as major problems during AARs. The lack of inter-operable radio’s usually tops the list of problems and rises to the top of a “needs” list. This assumes that radio traffic will always be possible, and that no other mechanism to communicate exists.

#### **E. TRANSITION**

The transition portion of this response framework quite possibly signals the end of chaos and the transition to the complicated or complex domain. If we accept that patterns emerge from chaos, despite the difficulty in predicting the exact nature of the pattern, then we accept the fact that patterns provide a foothold from which control can be gained.

As control is gained, a possible solution is more likely to be apparent. A reverse tipping point can occur. That is, instead of the event moving forward toward an uncontrollable catastrophic failure, just the opposite occurs. The event moves from a point of criticality to a lesser point that affords responders the ability to impact the event.

The transition moment can manifest in two forms. First, the circumstances of the event once near the critical boiling point change in such a way to allow the response to be undertaken by an existing protocol. For example, during 9/11, responders had never faced a response on the scale of two planes striking two large buildings nearly simultaneously. However, after both buildings collapsed, the event became a USAR event. In no way is this an attempt to minimize the tragedy of the events of 9/11, rather it is used as a teaching point to demonstrate the innovative ability of responders to take an unknown response and transition it to a response that they are familiar with and one that they are exceptionally good at undertaking.

The second possibility at this phase of the event is for a plan to be developed by the command element to address the concern. The initial steps taking by the first responders during the first four steps of REACT provides valuable time for command elements to move from sense making to decision making. The REACT framework serves this purpose well. If responders are trained to begin taking action upon arrival, regardless of how slight or small the step may be, command elements know that very basic steps are underway in an attempt to gain control of the crisis. As long as command elements are free from having to make every decision, they become free to make the important decisions. Further, if they mature through the REACT framework, they learn from the smaller decisions they made while being front line responders.

The maturation process of leadership in this framework makes the assumption that all members of a responding agency, with the possible exception of the chief officer, started at the entry level of the occupation. There are some lateral transfers that occur throughout the first responder community; however, the vast majority of the emergency response community is made up of career members. This is an important function of this framework, as it is critical to the socialization process that is necessary for this framework to exist and thrive. Should circumstances change allowing the wholesale

movement of personnel between employers, to include command level staff, this suggested framework could be rendered ineffective. This type of movement often occurs in the civilian business world as leaders from one company are hired to run another, completely different type of business. This has yet to take place, on a large scale, in the world of emergency response.

Just as it is very important for responders to recognize that they have entered into a chaotic event, it is equally important for them to realize that they have exited out of the chaotic event. This transition point, or de-escalation point, signals an end to the chaos. Ideally, this point will be easily identified by those working the event. It is this “cease fire” moment that signals to all responders that the event has changed for the positive and control has been gained.

This framework, coupled with other programs, can serve as the foundation for first responder organizations responding to chaos. Programs, such as United Airlines Crew Resource Management (CRM), appear to be a companion program that can assist decision making among first responders. Coupled with REACT, CRM will enhance responder effectiveness.

The stated goal of CRM is “to enhance a critical set of observable interpersonal human behaviors that go beyond technical stick and rudder skills.” It is also designed to augment the technical skill of the pilot. If this program is merged into the first responder community, we would simply replace the reference to “stick and rudder” pilot skills with the “skills and expertise” of the first responder, regardless of the discipline to which they are associated. The CRM program also addresses internal problems noted as pilot error as well as external threats such as weather or foreign object debris. Again, these same issues can be looked at in emergency responders. Errors will be made by responders and threats may exist that impact the ability of the responder to address the problem at hand. The CRM program also addresses anticipated and unanticipated problems. Once again, the Cynefin framework realm of knowable, unknowable factors into

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## V. APPLICATION AND IMPLEMENTATION

### A. APPLICATION

#### 1. Mann Gulch Fire

In his article “The collapse of Sensemaking in Organizations: The Mann Gulch Disaster,” Karl Weick sets the stage for the analysis by using excerpts from Norman McLean’s book *Young Men and Fire*. Weick condenses the work of McLean, which leaves a very careful balance of factual information with enough of the writer’s creativity for the reader to be able to formulate a mental image of this event. I have elected to use Weick’s interpretation because of its mastery of the two points raised above.

The brilliantly written story provides multiple points of inquiry and various avenues for discussion. As written, the story enables the reader to identify critical points within the story that help push this event from a “routine” fire to that of a disaster.

First, the story provides the reader with points in the timeline that provide the smokejumpers with points of possible perception. This term is often used in crash reconstruction as a point in time when a person could have reasonably perceived the danger. It does not imply that the person would have time to evade the danger. In fact, quite often the point of possible perception is used to demonstrate that the crash was unavoidable because the person could not physically respond in the allotted time. In this case, the points of perception are identified as points that began to signal a change in the expected outcome.

In his review of this incident, Weick points out that the jumpers believed this fire to be a “10 o’clock fire.” In other words, this was a fire that was expected to be out or under control by 10 o’clock the next day. Taken by itself, this fact does not alter the event significantly. As the jumpers were preparing to fly to the scene, weather reports indicated that temperature to be 97 degrees, which resulted in a fire rating of 74 out of 100. Maclean describes this condition as “explosive.” Before the plane even takes off, one assessment of the fire is that it is a routine “10 o’clock” fire, yet the fire rating is categorized as “explosive.” This conflict provides a point in time at which the firefighters

could have begun to recognize that something was different. At the very least, it was possible for them to recognize the potential for something different.

Psychologists point to the value of priming when preparing for an event. Mental preparedness has been shown to dramatically impact how an event unfolds. Emergency responders constantly run through scenarios in their mind, as they respond to calls for service building a mental picture of what they expect to find and how they expect to handle the event. Clearly, at this point, the Mann Gulch smokejumpers anticipated “routine.”

During the flight to Mann Gulch, there was considerable turbulence. So much so that one smokejumper became sick. Even with a rudimentary understanding of flight, turbulence translates into unsteady weather conditions, particularly wind. As they approach the fire, weather conditions again force the smokejumpers to jump from 2000 feet, which is almost twice as high as the preferred altitude of 1200 feet<sup>1</sup>. No reference is made regarding the egress from the plane or the descent to the landing zone. Without more information, again the assumption would be that this part of the jump was normal.

The next red flag to occur was the fact that the parachute attached to their radio did not open, which resulted in the radio being destroyed upon impact with the ground. Without a doubt, the reliance on radios in 1949 is different than it is today. The radio may not have been considered vital to front line firefighters. Perhaps Dodge, the leader, was the only person with the expectation that a radio was important.

After eating supper, which appears to be standard practice upon arrival at the scene of a fire, Dodge and Harrison moved to scout the fire. They are reported to have considered the area where they landed to be a “deathtrap.” They return to the other members of the team and report to the second in command Hellman their findings. There is no indication that the information regarding the severity of the fire was relayed to the other members of the team. If this information was not passed on, a vital piece of information was withheld from the smokejumpers.

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<sup>1</sup> As I am not a skydiver nor am I a smokejumper, I cannot comment on how much this variation deviates from the operating norms. I make the assumption that the altitude of 1200 feet is not a random number.

The turning point in the response is articulated by Maclean's sentence "Then Dodge saw it!" This is the turning point in the event and the "oh, shit" moment. At this point, everyone in the group should have recognized immediately that circumstances had changed. Although the facts of the case suggest that eventually everyone would arrive at the "oh, shit" point, Dodge's recognition and warning immediately leveled the field, as everyone was now aware of the seriousness of the situation. Because they were already "in" the event, the response component of this framework does not apply. Dodge clearly recognized that the event had transitioned quickly from a firefighting mode to a survival mode. He recognized that he and his crew were standing in a field of dry grass, in windy conditions, facing an uphill slope with fire at their feet. The calculated rate of burn was over 600 feet per minute. For these smokejumpers, the speed of the fire was far faster than they could run.

Dodge engages these new facts and quickly determines that the only solution to their predicament is to light an escape fire. He decides to burn a hole in the fire. He orders the crew to drop their gear and prepare to use the burned area for cover from the approaching fire. For reasons unknown, only Dodge uses the escape fire. Two other members of the team escape through a small crevice at the top of the ridge while one member makes it to the top of the ridge, however, he is burned so badly that he dies the next day. All the other members of the team die in the fire. The time from arrival on the scene to death is less than two hours.

This event shows that the reductionist mindset is required to change at or near the "oh, shit" moment. The policy and procedure for fighting this sort of fire is not called into question. The smokejumpers arrived on scene, ate and scouted the fire. After these actions, the smokejumpers were moved toward the river to begin fighting the fire.

At the tipping point, the "oh, shit" moment, Dodge appears to be the only person to move from a reductionist mindset into a holistic mindset. He shakes the tunnel vision and makes a series of exceptionally fast calculations based on the entire situation that results in him identifying the satisficing solution of burning an escape fire (satisficing being the concept of using the first solution that fills the need, regardless if it is the best solution). In this case, continuing to run up the hill was a possible solution, which in fact

worked for two members of the team. Another possibility would have been to drop their gear, as ordered by Dodge, and then continue to run. It appears that this option was attempted unsuccessfully by twelve of the thirteen smokejumpers that perished.

What is strange about this case is the fact that those smokejumpers that appear to have remained in the reductionist mindset did not follow the orders of Dodge who told them to drop their gear and use the cover of the escape fire. Because these smokejumpers perished in the fire, we will never fully know what took place on the mountain. Some may have heard the order to use the escape fire and ignored it, and some may not have heard the order due to the noise of the approaching thirty-foot high flames. It is nearly impossible to reconstruct this part of the event, but it is clear that a significant breakdown in decision making occurred.

Had these firefighters heeded Dodge's warning and survived using the escape fire, they would have been able to communicate by alternative means and transitioned into the plan for extraction from the mountain, or put themselves into position to re-engage the fire. Dodge's ability to improvise under the stress of the situation demonstrates the need for the mindset of responders to mentally prepare for the unexpected. When necessary, rules, such as never dropping your equipment, need to be ignored. Responders must be taught that improvisation is expected, allowed and encouraged, especially during a life-threatening situation.

## **2. North Hollywood Bank Robbery**

On February 28, 1997, the Los Angeles Police Department became involved in the largest police gun battle in the United States. In a matter of 44 minutes, LAPD officers and the two suspects fired over 1750 rounds of ammunition combined. Nine police officers were wounded and both suspects ended up dead. This encounter unfolded quickly and was a catalyst for change in the law enforcement community.

In a post titled *5 Gunfights that Changed Law Enforcement*, Policemag.com described the encounter as follows:

The Los Angeles officers who found themselves under a barrage of heavy machine-gun fire from the [North Hollywood bank robbers](#) quickly realized that their 9mm pistols and shotguns were ineffective against the armored gunmen.

Officers responding to the Bank of America branch along Laurel Canyon Boulevard on Feb. 28, 1997, engaged Larry Phillips, Jr. and Emil Matasareanu from the cover of a locksmith shop across a four-lane thoroughfare. Officers typically trained at 25 yards with 9mm handguns fired from 70 yards, attempting to answer the military-style rifles—a full-auto Romanian AIM AK-47 variant, Norinco Type 56 S-1, semi-auto HK91, and modified Bushmaster XM15 E2S—used by the suspects, who had loaded 3,300 rounds of ammo in box and drum magazines in the trunk of their white Chevy Celebrity.

Nine officers were wounded, and one LAPD Crown Vic squad car was hit at least 56 times during a gun battle that lasted 44 minutes. During the blistering gunfight, 650 rounds were fired at the suspects, who fired 1,101 rounds at officers.

With his troops outgunned, Lt. Nick Zingo authorized officers to head to nearby BB & Sales Guns to acquire rifles to match the ones fired by the suspects.

Following the shootout, which was broadcast locally on live television, law enforcement agencies began providing AR-type rifles to patrol officers. In some cases, the rifles were installed in cruisers. In the case of the Florida Highway Patrol, rifle training was provided and officers bought their own rifles, says Ayoob.

The LAPD also added ballistic Kevlar plating inside the doors of its cruisers.

Two important lessons come to mind from the North Hollywood shootout, says retired LAPD Capt. Greg Meyer, a member of the **POLICE** advisory board. First, it is essential these days to equip patrol officers with rifles. Incident after incident around the country proves this. The North Hollywood officers did not have that resource until SWAT arrived on the scene in the final minutes of the shootout. Second, several of the nine heroes wounded were detectives, male and female. Don't overlook tactical training for your detectives.

Perceptive agencies also noticed a rescue of a downed colleague by Officer Anthony Cabunoc and his partner with a police cruiser. A lot more departments seem to model the excellent extrication work that was done

there in the field, scooping in and using vehicles as cover to pick up the wounded officers and evacuate them from the field of fire, says Ayoob. That was widely emulated.

(Policemag.com, 2011)

Different than the Mann Gulch case, the LAPD North Hollywood shootout case shows the impact of a number of different emergent factors. First, the enemy was human. A thinking, moving target that had the ability to shoot back at anyone they encountered. Certainly fire can behave erratically, but certain physical elements must be present for the fire to exist. In the North Hollywood case, the gunmen had the capability to move, respond and alter their course of action.

Another factor that this case demonstrates is the unique environment of the encounter. This encounter was not a two-dimensional event between police and the suspects. A third variable was very evident. The presence of civilians during the encounter added another variable to the human element of the equation. Not only were patrons and workers present inside the bank, much of the shootout took place in a very urban environment. The shootout transitioned from a commercial, business area to a residential area where residents would have no expectation that activity associated with a bank robbery was occurring.

The active shooter event is the ideal event from which to apply Follet's Law of Situation. The back and forth nature of this event demonstrate the need for innovation and adaptation during crisis. The delicate dance between the suspects and the police is dictated by the previous move. With each action, almost immediate feedback occurs. Both sides are able to recognize favorable moves and unfavorable moves as soon as the act is committed. The "Follet effect" may render plans ineffective almost as soon as they are implemented.

The North Hollywood bank robbery starts out unusually because the suspects are observed entering the bank by a police officer and his partner that just happen to be driving past the bank. It is not common for a robbery in-progress to be interrupted by police officers on patrol. Due to dispatch delays, most robberies are dispatched several minutes after the robbery occurs. The fact that these suspects were seen entering the bank

is highly unusual. The officers immediately report a bank robbery in progress and request more units to respond to the location. The standard procedure for such an event would be to surround the bank and wait for the suspects to exit before engaging the suspects. Another possibility would be for the suspects to recognize that they were surrounded and then hole up inside the bank with hostages.

Using the point of possible perception idea, the fact that this robbery was discovered prior to it taking place is the initial point in time that responders could begin to perceive that this event was outside the norm. It can be surmised that the other officers responding to the call recognized this highly unusual occurrence and began to respond. It is not clear how many officers were dispatched and how many “self-dispatched.” Frazzano points out that fifteen police officers had surrounded the bank before the suspects could leave and by the time the event was over, more than 370 officers had responded (Frazzano, 2010). In addition, the facts show that several detective units in plain clothes also responded to the scene. This tends to indicate that these officers heard the radio traffic and responded, as detectives are not typically dispatched as primary responders to in-progress events. This equates to a swarming maneuver described by Sean Newman in his thesis regarding the integration of certain fire and police units (Newman, 2011). Perhaps another way to view this response would be to compare it to the activity surrounding an ant hill. If the ant hill is disrupted to any significant degree, the ants immediately begin to swarm the mound with the intent of defending the hill and protecting the colony. The ants do not require any specific or structured orders instead they begin to respond and get to work.

The “oh, shit” moment occurs when the first robber (Phillips) exits the bank. Once outside, he immediately begins to engage the police with his weapons. Police immediately return fire; however, their weapons are ineffective against the body armor worn by the suspects. Again, the circumstances changed drastically as the suspects leave the bank, contrary to police expectations. The apparent ability of the suspects to be immune from the hail of gunfire aimed in their direction confirms to the officers on the scene that a chaotic event is occurring. At this point, the only thing in favor of the LAPD is that fact that multiple officers have arrived on scene, and they appear to be attempting

to cordon the shooters by means of a rolling police containment circle. There does not appear to be any sort of coordinated effort on the part of officers on the scene to conduct this cordon operation however it appears that officers naturally took up positions surrounding the suspects for the purpose of maintaining visual contact and perhaps placing themselves between the gunmen and the unknowing public.

It is clear at this point that some officers intentionally inserted themselves into the event and others found themselves in the event. Regardless of how they entered the event, all the officers found themselves in an event that required them to improvise, innovate and collaborate. There was no plan to address this sort of threat. Although the officers were not alone, each officer faced the threat individually based on the action of the shooters.

Perhaps the most significant improvisation came when police Lieutenant Nick Zingo authorized officers to go to BB and Sales Guns to acquire weapons capable of penetrating the body armor worn by the suspects or, at the very least, give the officers an opportunity to return effective fire from a safe distance. It is not clear if the acquisition of these weapons significantly impacted this encounter. What is significant is the fact that a solution emerged from the chaos and Lt. Zingo recognized that this extraordinary event required extraordinary measures. Whether he contemplated the impact of his actions prior to issuing the order, or if he recognized the gun store as a satisficing option, is not clearly documented. Regardless, his ability to holistically address the problem at hand is commendable.

Another satisficing solution was implemented by Richard Massa. During the encounter with the gunmen, Officer Massa recognized that the LAPD duty weapon was ineffective against the suspects. Again, it is not clear if he recognized the suspects to be heavily protected by soft body armor, or if his perception was only that the current tactics, in particular the aiming point, was not neutralizing the target. Regardless, he recognized that the tactics of shooting a suspect, center mass, was not working. Officer Massa adjusted his aiming point and began to try and shoot the suspects on the only area of their bodies that appeared vulnerable, their feet.



The inability of the officers to contain the movement of the suspects was presenting the officers on scene with an incredibly difficult dilemma. They were forced to withdraw and tactically retreat as the suspects continued to move wherever they wanted to move. Ideally, the suspects would be contained within a police perimeter. Despite being outgunned, a solid perimeter would enable the officers to provide the necessary buffer between the gunmen and the public. At the very least, containment would allow time for other officers to arrive on scene who would be capable of addressing the threat. Handguns and shotguns at the distances for this event were completely ineffective. Without effective weaponry, the officers were forced to move with the suspects as they moved. This forced the officers into a situation where they could only monitor the suspect's movement. Their mission of protect and serve was not being met.

Officer Massa attempt to immobilize or restrict the movement of the gunmen was innovative. Recognizing that he could not neutralize the threat without an incredibly lucky shot, Officer Massa attempted to slow the advancement by taking out the suspect's feet. Slowing or stopping the advancement would allow better containment until a more effective solution could be implemented. Slowing the advance created more time. It is this sort of decision making that is necessary and needs to be cultivated.

Another innovation noted in the Policemag.com description is the use of a police car to rescue a downed officer. On its face, the actions of the officers to rescue their comrade does not appear innovative, however, the actions of the officers speaks to the value of allowing on-site decision making by responders engaged in a dynamic event.

### **3. U.S. Air Flight 1549**

Perhaps the most well-known plane crash in modern, American history, is the crash of U.S. Air flight 1549 on 1-15-09. Shortly after takeoff from New York's LaGuardia airport, flight 1549 flew through a flock of birds. The bird strikes compromised the vision of the pilots and also resulted in catastrophic engine failure for both of the plane's engines. In fewer than three minutes, the pilots of this aircraft executed a water landing in the Hudson River. All passengers and crew of the plane survived, with only a few suffering minor injuries.

A unique aspect of this event is the captive situation of the pilot and co-pilot. The respond and engage aspect of the response framework does not apply, as the pilots had literally two choices. They could accept a crash or they could act. The option to leave or disengage was not available. This situation demonstrates the incredible speed at which decisions can be made under tremendously tight time constraints.

Within one minute of losing all power on his aircraft, radio transmissions indicated that Capt. Sullenberger had already verbalized the possibility of landing in the Hudson River (FAA, 2009). Contrary to what many believe, the idea of landing a commercial aircraft in a river is not part of any emergency protocol. Col. Robert Hehemann, USAFR, a pilot as well as an instructor pilot with over twenty years of flying experience in both military and commercial aircraft, notes that although ditching an aircraft is considered for flights crossing large bodies of water, no practice or simulations for landing in a river take place in commercial or military aviation (Hehemann, 2012). The decision making exhibited by the pilots of flight 1549 is nothing short of exceptional.

Rake and Nja point out that decisions during a crisis are often made the moment the decision maker sees the scene (Rake & Nja, 2009). Sullenberger's decision to land in the river took less than a minute. He was on scene and did not wait for instructions from someone else to tell him what to do. The responder, on scene, made the decision.

Once the decision to land in the river became the satisficing decision, Capt. Sullenberger communicated his plan to air traffic controllers, as well as the passenger and crew on his aircraft. The emergency response transitions to a cold water rescue once Sullenberger successfully lands the plane in the river. The only difference in this plan is that instead of a boat sinking or a car plunging into the river, a plane is the vehicle that carried the victims into the water.

Another aspect of this event that is often mentioned, but seldom examined, is the rescue operation undertaken by the various ferries and boats in the area of the "landing." Without being asked, boats nearby quickly engaged in rescue activities. This spontaneous action appears to be very similar behavior to that of emergency responders when faced with a chaotic event.

#### **4. Joplin, Missouri Tornado**

The tornado in Joplin, Missouri is a recent event that is fresh in the minds of many people. The devastating event strikes a chord with Americans from coast to coast. The unpredictability of weather is the sort of chaos that requires a unique response from all first responders. In addition, weather is an event that transcends all jurisdictions. All jurisdictions have the ability to learn from the response of others because every jurisdiction experiences weather, to some degree. Regardless of how the damage is caused, the end result is the same. Response and recovery require improvisation and innovation.

The lessons learned website operated by FEMA provides the following executive summary regarding the Joplin tornado:

On Sunday, May 22, 2011, a catastrophic Enhanced Fujita-5 (EF-5) tornado struck the City of Joplin, Jasper County, and Newton County in southwest Missouri in the late afternoon. With winds in excess of 200 miles per hour (mph), the  $\frac{3}{4}$ -mile-wide tornado cut a 6-mile path of destruction through central Joplin. The tornado caused 161 fatalities and approximately 1,371 injuries as of May 27, 2011, making it the single deadliest U.S. tornado since 1947. Thousands of structures were destroyed or damaged, from single family homes to apartment buildings to large retail and public buildings, including St. John's Regional Medical Center, the Home Depot, and Wal-Mart.

In the aftermath of the tornado, emergency responders and the public began conducting search and rescue operations in damaged buildings and provided medical care and shelter for survivors. The tornado overwhelmed the capabilities of the City of Joplin, Jasper County, and Newton County, requiring a massive response from Federal, State, county, local, private sector, non-profit, and voluntary organizations. Personnel from more than 400 public safety organizations deployed to Joplin to assist with response and recovery operations. (FEMA, 2011)

The Joplin Missouri AAR points out several issues that relate well to the proposals set forth in this thesis. First, the disaster overwhelmed the emergency response capabilities of Joplin. As such, any plans, protocols and previous experience are diminished, if not obsolete. Secondly, the summary points out that over 400 public safety agencies responded to Joplin to assist (FEMA, 2011). Mutual aid is common throughout

the first responder community; however, it is highly improbable that any one agency has 400 mutual aid agreements on file just in case a catastrophic event such as the Joplin tornado strikes.

The Joplin tornado AAR references Presidential Policy Directive 8: National Preparedness and quotes FEMA Director Fugate as saying “What we really need to be doing is planning for disasters that go beyond our capabilities” (FEMA, 2011). This quote speaks in support of the “all-of-Nation” approach championed by FEMA. The Joplin tornado is a perfect example of just such a response and is supported by the fact that 400 plus agencies responded. What is not addressed is how the “home team,” the local responders, are supposed to respond to event when assets, be it people or equipment, are not available. What do we expect them to do? What is a reasonable expectation? Can we teach them to make decisions in the face of chaos?

The Joplin AAR points out that 400 agencies responded to provide assistance. In addition to the professional responders, FEMA has documented over 178,000 hours of volunteer time associated with the response and recovery. The report does not specify the day-to-day amount of volunteer hours logged, but it is reasonable to believe that as time progressed, more volunteers showed up and logged more hours. The response of untrained volunteers is often pointed out as a problem during an emergency response. This paper will suggest just the opposite. FEMA’s own USAR curriculum points out that less than five percent of the victims of a structural collapse will require the technical skills of a USAR team (FEMA, 2000). Another 15 percent will need the assistance of professional emergency responders (FEMA, 2000). The remaining 80percent will either self-rescue or be rescued by community teams (FEMA, 2000). These numbers should be parlayed by first responders as force multipliers. The concern should be focused on the rescue of people and not the potential liability of an untrained civilian responder. Key to this point is that fact that the untrained rescuer is to be used in the face of the chaotic event such as the Joplin tornado, not a structure fire at a single residence or motor vehicle crash. It is imperative that the model suggested in this thesis not be applied to routine or common emergency responses.

## **B. IMPLEMENTATION**

Implementation of the REACT framework is quite simple. It will not require weeks of specialized training involving specialized instructors. A simple understanding of this conceptual framework will provide any responder with the tools needed to respond to chaos. Any leader that accepts the premise put forth in this paper can easily teach subordinates the simple steps needed to address chaos.

The conversation with a new police officer, firefighter, paramedic, or any emergency worker would sound like this:

If we have the “Oh, shit” call, whether it’s you or someone else, I need to know that you will respond. Nothing will get accomplished if you don’t respond. Sometimes, we will call for you and sometimes the dispatchers will call for you but you have to understand that there may be times that the person on the scene can’t talk and call for help. If you get there and are not needed, I need you to leave and return to your regular duties. Too many cooks ruin the meal and the same goes for us.

If you get there and you not sure exactly what is happening, my expectation for you is to gather information on the way by whatever means you can. Listen to the radio, check the computer (CAD), use everything available to get engaged and mentally prepared. I need you to be ready get involved if you are needed.

If everything is pointing towards the fact that you are needed, I need you to get into the fight. Whatever you see from your point of view that is important, I need you to act upon the facts. Understand, I will be doing the same thing you are doing and so will everyone else riding beside you. Take actions that are necessary to stop or reduce the threat. Life safety is the utmost task. You will never get into trouble saving a life.

The minute you are able, I need you to let someone know where you are and what you are doing. I would prefer you call dispatchers but another officer may be all you are able to reach. It is imperative that you communicate with others, so we can help you if needed, or we can move you somewhere else to help out.

As some point, the event will stabilize and begin to look like something we are familiar with and that is when I need you to apply all of your training and transition into the response mode that you were taught in the academy. Once we move into the transition mode, there will be plenty of people directing the response. That’s when I need you to follow orders and complete your assigned tasks.

This is a big task, but you are capable of handling it. If every one of us operates in this manner, we can cross the “Oh, shit” river. We might get wet and we might get hurt, but we will cross the river and get back to normal. No one said it would be easy, so we shouldn’t expect an easy solution.

Teaching this method is as simple as talking about it. Priming people to make decisions will teach them to make decisions. Gary Klein points out in his book “The Power of Intuition” that leaders train their successors. He further notes that there are five sources of uncertainty: missing information, unreliable information, conflicting information, noisy information, and confusing information (Klein, 2003). All of these sources have the potential to arise in a chaotic emergency scene.

Klein points out several methods for addressing this uncertainty. One of the ways is to press on (Klein, 2003). He demonstrates this by referring to General Colin Powell who stated he was willing to move forward with 70 percent confidence. He accepted that information was not always perfect. When viewed from the REACT framework, this action with less than perfect information would involve responding, engaging and acting.

Another method for addressing uncertainty is simplifying the plan (Klein, 2003). The REACT framework is very simple and requires no formal plan. One step at a time is sufficient provided that others are also taking one step forward.

Klein further suggests that using incremental decisions is also a successful tactic (Klein, 2003). This fits closely with the concept of Little Bets. We should not expect responders to go “all in” with everything available. Small, calculated risks provided the responder with the ability to assess and gain immediate feedback. If it works, this can be communicated and replicated. If it doesn’t work, this too can be communicated so it is not replicated.

Another method Klein suggests is embracing the uncertainty (Klein, 2003). Ultimately, this is the premise of this entire paper. The only constant in chaos is change. Responders should prepare for change and expect change. They should not be surprised by change.

### **C. FUTURE RESEARCH**

Without question, more research into the decision-making process of first responders is needed. As technology improves, so too will the ability of researchers to collect data on responders in field situations. The efficacy of the strategy proposed to teach young, front line troops to make decisions, even if the decisions are wrong, may be questioned by others.

It would be prudent to attempt to identify and interview responders that improvised, innovated, and collaborated under unique situations to see if we can further understand the thought process. Is this thought process truly emergent or can it be taught? If it is learned behavior, how was it learned and who are the teachers?

If this framework is taught in a formal environment, a methodology for tracking the success of implementation will need to be developed. It may be difficult to identify exactly when this framework was implemented by a responder. Because part of this thesis is an attempt to codify a response mechanism that may already exist, responders may have difficulty identifying when they acted in accordance with the REACT framework or if they did “what they always do.”

Some may suggest that this framework is very subjective. The author cannot refute that fact. By teaching this framework, we cannot discount the fact that there may be an effect similar to a placebo effect. A responder may have no mental recollection that the framework was applied. A responder may say “I was just doing my job.” In-depth interviews may need to be conducted to try and deconstruct the actions of the responders. Perhaps data will exist, such as flight recordings, which can give researchers insight into how a specific responder behaved during a crisis.

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## **VI. RECOMMENDATIONS AND CONCLUSION**

### **A. FINDINGS**

This research suggests that front-line decision making during crisis currently takes place, with or without supervisory approval. Many examples exist that demonstrate responders are capable of making split second assessments of crisis and translating that thin slice into a proactive, effective emergency response.

Emergent decision making and sense making often lead to innovation. It is through improvisation that new techniques are discovered. Innovative agencies become resilient. A resilient organization takes on the qualities of a starfish.

### **B. RECOMMENDATIONS**

The REACT framework is about trust and about leadership. Every day, across the country, first responders go to work. In most cases, their day-to-day actions are undertaken with only cursory supervision. The trust placed in the hands of these front-line responders on a day-to-day basis should be extended during the initial stages of response to crisis. As suggested by REACT, and supported by the referenced cases, responders are more than capable of making small decisions that likely will impact the overall event. It is these proactive, small decisions that develop the skills of the responder community and prepare them for the unknowns that they may face in the future.

As leaders, it is imperative that we reduce the use of phrases such as “just hold what you got, I’ll be there in a minute.” Imagine being in an emergency room and overhearing a doctor being told “just hold on a minute, I’ll be there shortly.” This would not be accepted, if we were a patient, and it should not be accepted in the emergency response community. Recalling the work of Barrett and Fry, “there is little capacity for creativity and innovation when one is overly concerned with avoiding mistakes or repairing something.” (Barrett & Fry, 2008 p. 20). We must recognize that mistakes do happen. As with crisis and chaos, it not the fact that we have made a mistake that is important, it is how we respond after making the mistake.

Should the REACT framework be implemented, the author would recommend that it be implemented via a series of little bets. This is not an all or nothing proposition. The process can be explored and validated on a small scale. With success, the use of the framework can be expanded. If needed, the framework can be modified.

### **C. CONCLUSIONS**

The result of this research is not beyond challenge and perhaps does not culminate in a concrete conclusion. As with any public safety protocol or procedure, there are always exceptions to the rule or situations that just don't "fit" the given framework. While this may appear to be a problem, the acknowledgement that no system is perfect and that response protocols can emerge is, perhaps, one of the most important takeaways. In the eyes of the author, failure to understand that the only constant is change is a death sentence. The very things that attract first responders to the field are the very things we try desperately to control. We should embrace the change and harness its power. Change is good and brings about innovation. Innovation is critical, as we learn how to address the constantly changing homeland security enterprise. As a leader, it is very difficult to cede a portion of the control of a chaotic event to the responders that are locked in hand-to-hand combat with the crisis, whatever the crisis may be. "They don't have time to make any decisions" we think. It is precisely because they are so close to the event why they should be given some control. With or without permission, they will be making decisions.

The response framework suggested in this work is not perfect. Just as there is no scientific mathematical "theory of everything," there is no single response protocol capable of handling every crisis. My goal in developing this framework is to empower responders and leaders with the same information. Leadership is a journey, not a class that one can take. We are derelict as leaders, if we do not allow our officers the opportunity to make decisions. One of the most important lessons in the book *Little Bets* is the chance to fail early. We have all heard the stories regarding how many light bulbs Thomas Edison made before finding one that works. We must allow our responder

community the same opportunity to develop their decision-making thought process. The counter to this is the opportunity to succeed early. Early success builds confidence, just as an early small failure provides a teaching moment.

Perhaps the second lesson in the framework is a challenge to public safety leaders to loosen the reins and let their responders respond. If we purport to desire to have a “starfish” mentality, then we should put our money where our mouth is and allow the resiliency that develops in a starfish organization to flourish.

The ideas presented in this thesis are designed to accomplish two things. First, and perhaps most importantly, they are designed to challenge the status quo and force leaders to re-examine the current structure for addressing chaos. The answers are not simple, and the solution may be as complex as the problem being faced. Despite the relative simplicity of the REACT framework, the concept is rather complex. This framework encourages junior members of organizations to make critical decisions during crisis response, and it makes the assumption that many individual small decisions will have a positive impact on the whole of the event. This may be a tremendous leap of faith for many leaders in the homeland security field. Just as a single rain drop is not responsible for a flood, responders may feel that individual decisions cannot impact the overall outcome of an event. The evidence suggests otherwise. Every decision is important to the outcome. We must train our responders to think in this manner. Ed Catmull, when describing how his company, Pixar, responded to crisis stated, “The measure is how we respond to the crises as they happen. We have to be comfortable being uncomfortable.” (Sims, 2011, p. 45) Being comfortable while in an uncomfortable situation is not a play on words, and it does not simply imply being confident. The ability to negotiate the turbulent waters of chaos, despite unknowns, is the goal of this framework.

Second, this thesis is designed to provide members of the first responder community, from the top of the organization to the bottom, with a simple response framework that can help them when no plan exists. It is not perfect, and it is not presented to be the final solution to the homeland security threat. As first responders, we must aim for perfection, but we must realize that sometimes, a satisficing solution is the

best we can do in the time available. With unlimited resources, staffing and time, a perfect plan can be created and implemented. The emergency response community does not have this luxury, so we must make do with what we have available. Perfect may not be possible. Humans are not perfect, and we should not expect emergency response to be perfect every time. REACT is a field expedient method to address an unknown. It is not an exact map, rather it is a holistic overview that allows for the individual to determine their path across “the river.”

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